# Suisun Marsh Monitoring Program
# Channel Water Salinity Report

Reporting Period: October 2010

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## 1. SUISUN MARSH MONITORING STATIONS AND REPORTING REQUIREMENT

As per SWRCB Water Rights Decision 1641, dated December 29, 1999, and previous SWRCB decisions, the California Department of Water Resources (DWR) is required to provide monthly channel water salinity compliance reports for the Suisun Marsh to the SWRCB. Conditions of channel water salinity in the Suisun Marsh are determined by monitoring specific electrical conductivity, which is referred as "specific conductance" (SC). The locations of all listed stations are shown in Figure 5.

The monthly reports are submitted for October through May each year in accordance with SWRCB requirements. The reports are required to include salinity data from the stations listed below to ensure salinity standards are met to protect habitat for waterfowl in managed wetlands:

| Station Identification | Station Name | General Location | Classification |
|---|---|---|---|
| C-2* | Collinsville | Western Delta | Compliance Station |
| S-64 | National Steel | Eastern Suisun Marsh | Compliance Station |
| S-49 | Beldon's Landing | North-Central Suisun Marsh | Compliance Station |
| S-42 | Volanti | North-Western Suisun Marsh | Compliance Station |
| S-21 | Sunrise | North-Western Suisun Marsh | Compliance Station |

Data from the stations listed below are included in the monthly reports to provide information on salinity conditions in the western Suisun Marsh.

| Station Identification | Station Name | General Location | Classification |
|---|---|---|---|
| S-97 | Ibis | Western Suisun Marsh | Monitoring Station |
| S-35 | Morrow Island | South-Western Suisun Marsh | Monitoring Station |

Information on Delta outflow, area rainfall, and operation of the Suisun Marsh Salinity Control Gates are also included in the monthly reports to provide information on conditions that may affect channel water salinity in the Marsh.

* Throughout the report, the representative data from nearby USBR station is used in lieu of data from station C-2.

## 2. Monitoring Results

### 2.1 Channel Water Salinity Compliance

During the month of October, 2010, all five compliance stations were in compliance with channel water salinity standards of SWRCB (Table 1). Compliance with standards for the month of October was determined for each compliance station by comparing the progressive daily mean of high-tide SC with respective standards. The standard for all the compliance stations were 19.0 mS/cm during October 2010. Table 1 lists monthly mean high-tide SC at these compliance stations. The progressive daily mean (PDM) is the monthly average of both daily high-tide SC values. The mathematical equation is shown below.

$$PDM = \frac{\sum \text{daily average of high tide SC}}{\text{\# days of the month}}$$

### 2.2 Delta Outflow

Outflow for October 2010 was normal this time of year. For the most part of the month, outflow was between 2,000 and 5,000 cfs, except in late-October where outflow peaked to about 14,500 cfs briefly due to runoffs from some precipitation activities at the tail end of the month as shown in Figure 3. Thereafter, outflow index dropped and ended the month about 5,700 cfs. The monthly Delta outflow is represented by the mean Net Delta Outflow Index (NDOI). The NDOI is the estimated daily average of Delta outflow. Mean NDOI for October 2010 is listed below:

| Month | Mean NDOI (cubic feet per second) |
|---|---|
| October | 5,412 |

## 2.3 Rainfall

Precipitation data are located in Fairfield, CA, and by the Fairfield Suisun Sewer District (FSSD). October 2010 had several rainfall events, all of which occurred at the second half of the month as shown in Figure 3. The largest rainfall amount occurred on October 25, 2010 with a daily total of 1.18 inches and the second largest rainfall occurred the day prior, with a daily total of about .55 inches. There were additional rainfall, but all of them had daily amounts below .25 inches, which is small overall. The monthly total is shown below:

| Month | Total Rainfall (inches) |
|---|---|
| October | 2.38 |

## 2.4 Suisun Marsh Salinity Control Gate (SMSCG) Operations

Operations and flashboard/boat lock installations at the SMSCG during October 2010 is summarized below.

| Date | Gate status | Flashboards status | Boat Lock status |
|---|---|---|---|
| October 1 – 11 | 3 Open | Out | Closed |
| October 12 – 31 | 3 Open | In | Open |

In anticipation of any salinity concerns during the control season, the flashboards were installed on October 12, 2010 by contractors at the request of DWR, DFD with radial gates open and boat lock gates open per NOAA agreement. Salinity levels in October at all compliance and monitoring stations were not of concern, thus the radial gates were not operated tidally during this month.

# 3. Discussion

## 3.1 Factors Affecting Channel Water Salinity in the Suisun Marsh

Factors that affect channel water salinity levels in the Suisun Marsh include:

- delta outflow;
- tidal exchange;
- rainfall and local creek inflow;
- managed wetland operations; and,
- operations of the SMSCG and flashboard configurations.

## 3.2 Observations and Trends

### 3.2.1 Conditions during the Reporting Period

During October 2010 PDM salinity levels at Collinsville(C-2), National Steel(S-64), Beldons (S-49), and Volanti(S-42) ranged between 6.0 mS/cm and 15.0 mS/cm as shown in Figure 1. Salinity levels at all compliance stations were stable throughout the month of October despite several storm activities in late October. Even creek influence stations such as S97, S21, and S42 did not seem to respond to the rainfall activities in late October, which indicate that only at certain amount of precipitation along with frequencies, will trigger salinity levels to reduce in the marsh.

Monitoring stations, S97 and S35 salinity levels were higher than the compliance stations, which is normal because of the proximity of these two sites being on the western end of the marsh, which is more brackish than eastern marsh stations. Not sure what to make of the short salinity drop in early October at S35, other than the possibility of the DFG drain gate removal action or misleading equipment recording could have led to such response in salinity pattern. It could not be rain because no rainfall activity was recorded in early October and duck club flooding up activity would not reduce salinity levels for the short timeframe observed.

Overall, salinity levels in October 2010 were at least 4 mS/cm or more below the monthly standard at all compliance stations.

### 3.2.2 Comparison of Reporting Period Conditions with Previous Years

Monthly mean high-tide SC at the compliance and monitoring stations for October 2010 were compared with means for those months during the previous nine years (Figure 4).

Mean salinity pattern of all compliance and monitoring stations resembles that of 2002 but at similar or higher level with the exception of C-2B. Compared to previous nine years, October 2010 salinity levels were ranked third in high Specific Conductance. Unlike past years, the higher salinity for October 2009 is probably a result of no gate operations needed to meet monthly standards in October and boat lock gates open when flashboards are installed to comply with NOAA fish passage requirements.

## Table 1

## Monthly Mean High Tide Specific Conductance at Suisun Marsh Water Quality Compliance Stations

## October 2010

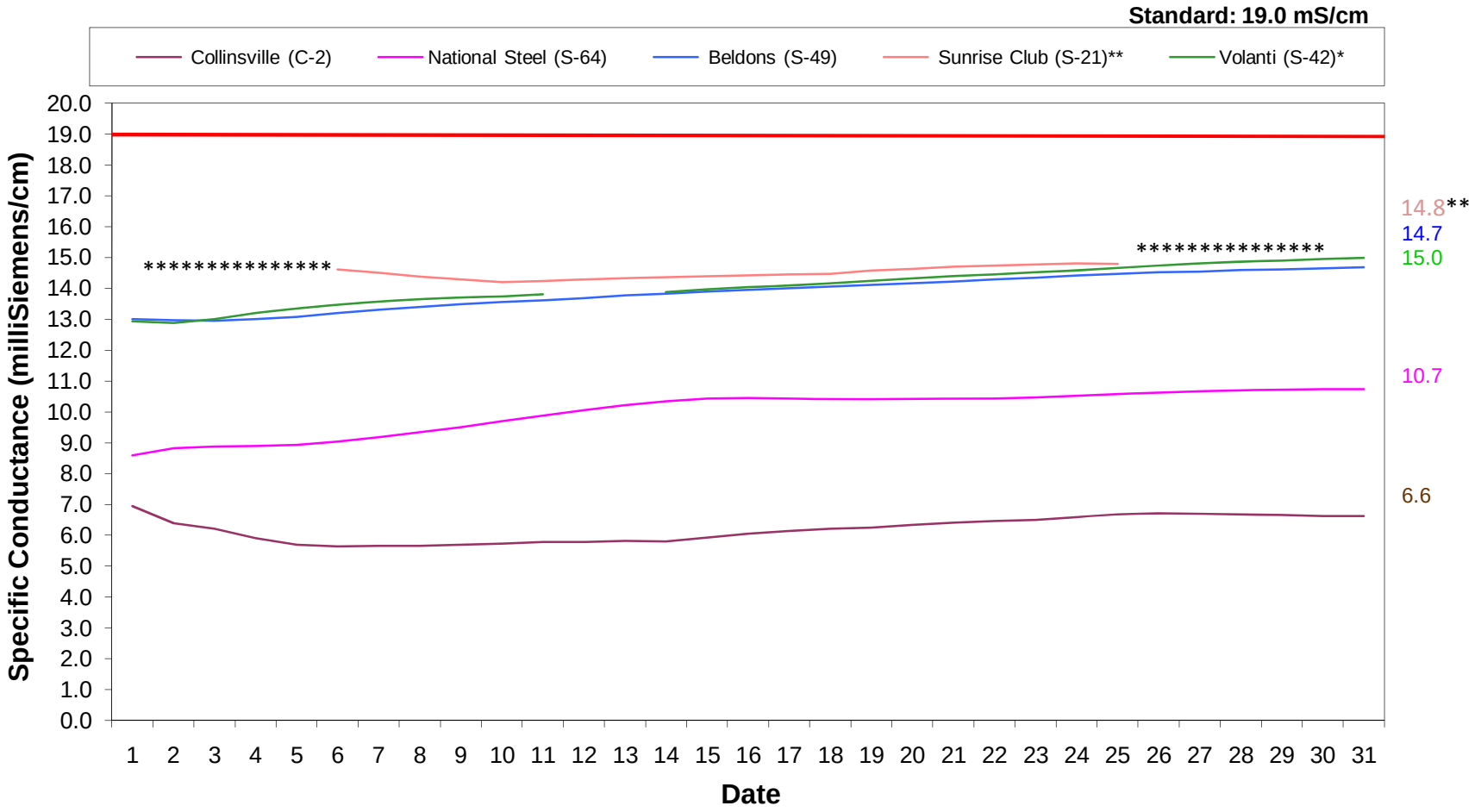
| Station | Specific Conductance (mS/cm)* | Deficiency Standard | Deficiency Standard meet? |
|---|---|---|---|
| C-2** | 6.6 | 19.0 | yes |
| S-64 | 10.7 | 19.0 | yes |
| S-49 | 14.7 | 19.0 | yes |
| S-42 | 15.0 | 19.0 | Yes |
| S-21*** | 14.8 | 19.0 | Yes |

*milliSiemens per centimeter

**The representative data from nearby USBR station is used in lieu of data from station C-2.

***S21 PDM value of 14.8 was based on good data between 10/6 and 10/25 and does not represent end of month value; however, S21 does somewhat mimic S42 in terms of patterns, and end of month PDM at S42 was well below the monthly 19.0 standard, thus S21 was most likely to have comply too.

**Figure 1. Suisun Marsh Progressive Mean High Tide Specific Conductance for October 2010**




****missing data due to QA/QC failure at S21. The 14.8 mS/cm value is based on data available between 10/6 and 10/25.

**Figure 2. Suisun Marsh Progressive Mean High-Tide Specific Conductance For October 2010**

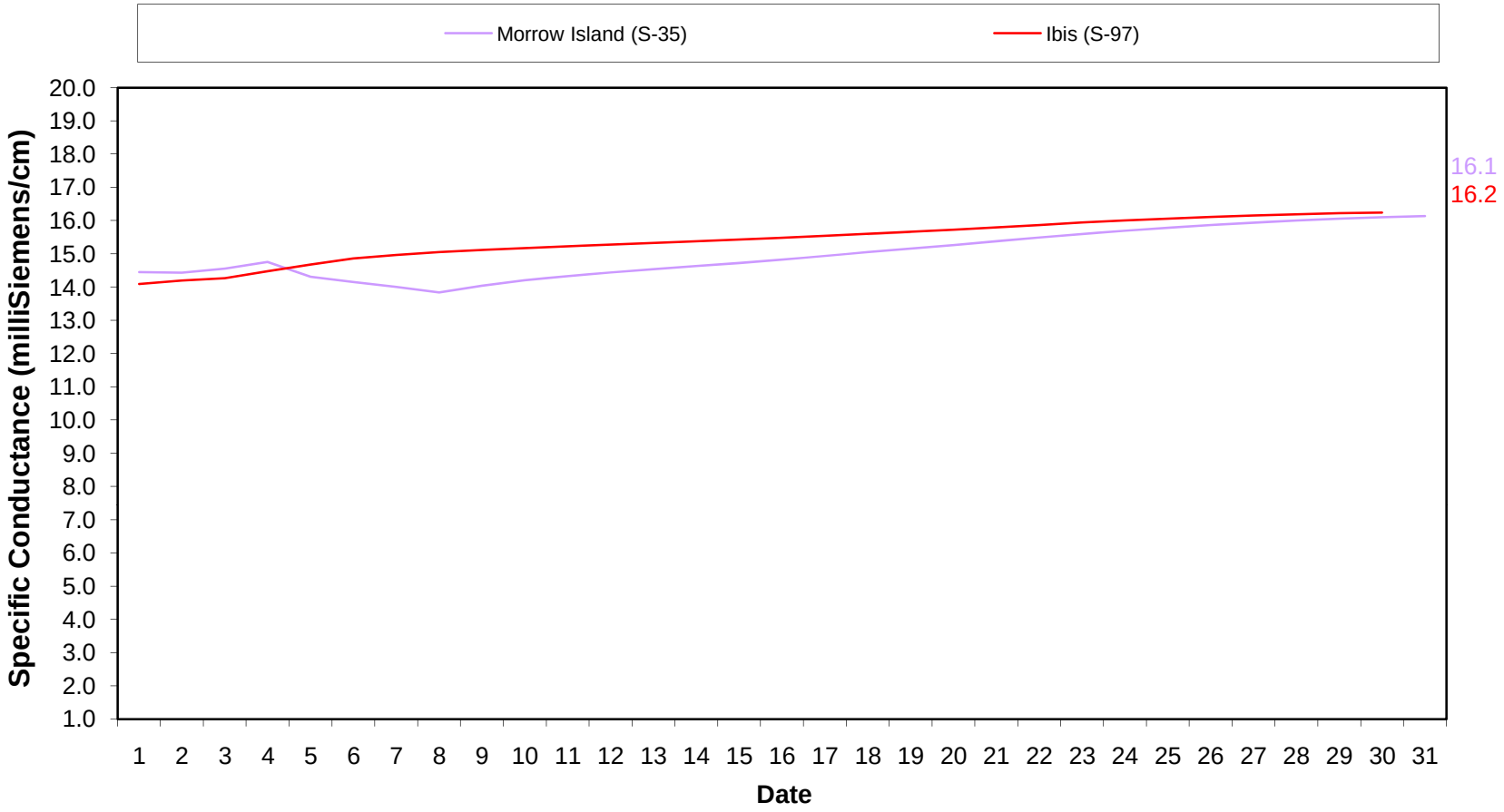
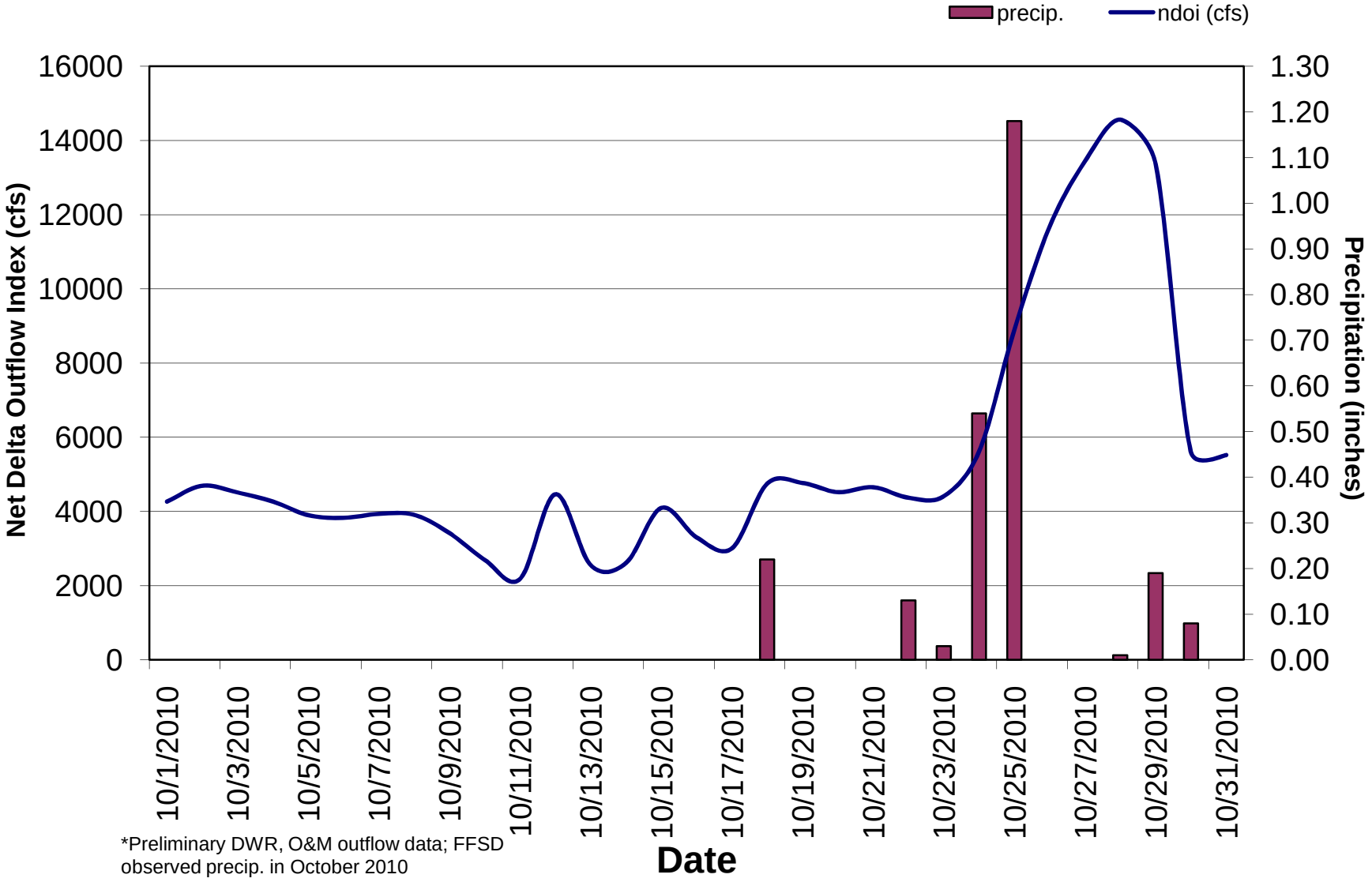
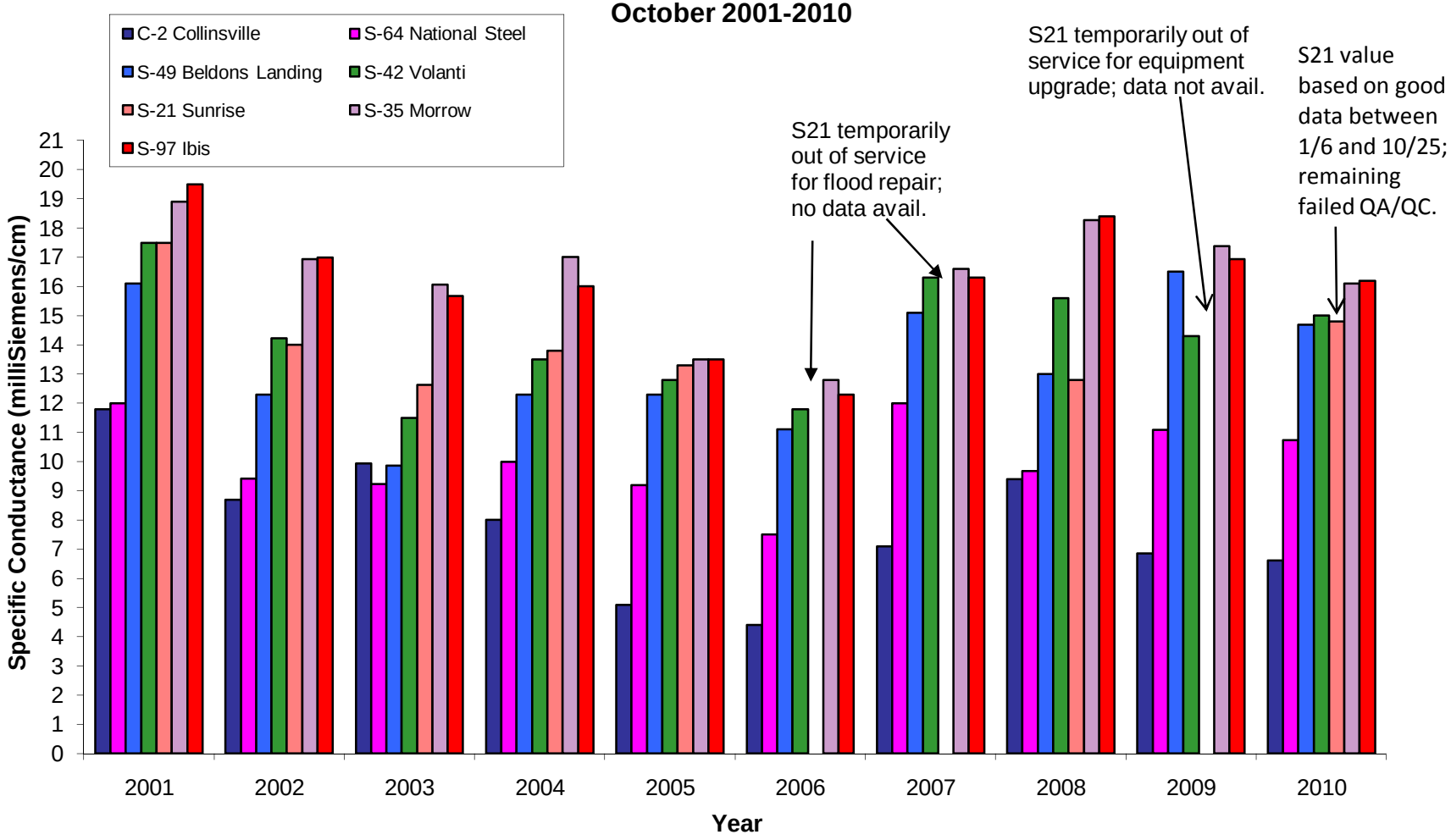


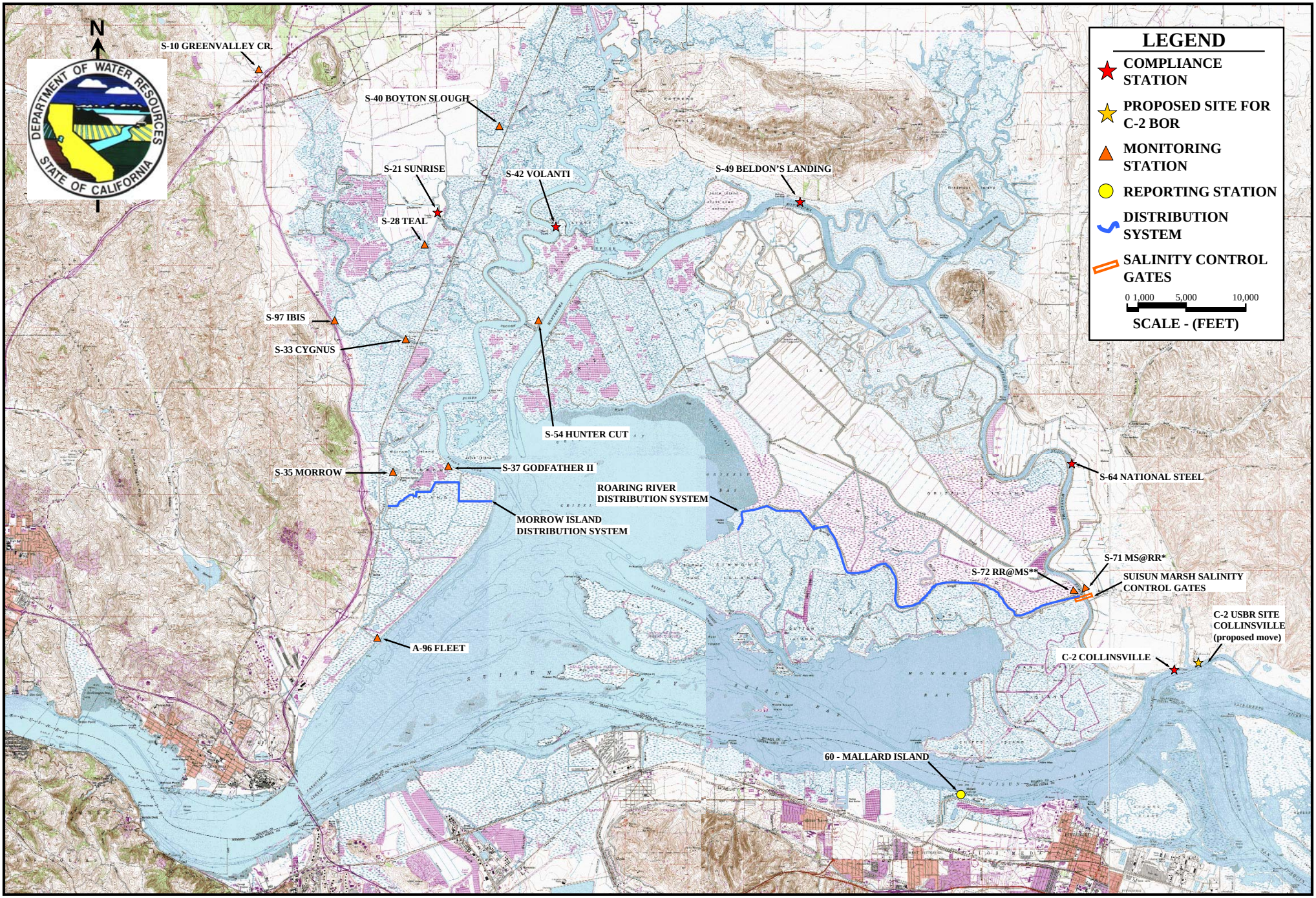
**Figure 3. Daily Net Delta Outflow Index and Precipitation***
**October 2010**




*Preliminary DWR, O&M outflow data; FFSD observed precip. in October 2010

**Figure 4. Monthly Mean Specific Conductance at High Tide: Comparison of Monthly Values for Selected Stations October 2001-2010**






# SUISUN MARSH PROGRAM WATER QUALITY MONITORING AND CONTROL FACILITIES